-MASTER-

GENERAL SPECIAL PROVISIONS

(Use as indicated in parenthesis)

4/19/01

Instructions for use of these General Special Provisions (GSP's):

This set of GSP's contains certain sections that do not appear in the MCDOT Supplements (English and / or Metric) to the MAG Standard Specifications. The GSP's are to be used as a framework for developing project special provisions. Individual specifications herein are to be review and modified as required by project specific conditions.

Select the appropriate sections for inclusion in your project's Special Provisions, copy and paste into your document, and modify to English or Metric as needed for your project. This document shows both units rather than maintaining separate GSP's.

Changes to the current MCDOT Supplements to the MAG Standard Specifications are added periodically for immediate implementation. These revisions are to be added to project special provisions when the project is to be advertised prior to the publishing of the next MCDOT Supplement. These items are not to be added to project special provisions when the construction advertisement date is to occur after the anticipated publication date of the next MCDOT Supplement. The MCDOT Supplement is published annually to be effective July 1.

Individuals preparing Special Provisions should be familiar with MCDOT Engineering Division's ***A Guide For The Preparation Of Contract Specifications***, revised April 2000.

Coordinate revisions and additions to these GSP's with Bob Herz (602-506-4760).

GSP2000
CONTENTS

Location (All Projects – fill-in)
(April 1, 1999)

LOCATION OF THE WORK: This project is located: _____Arizona (Maricopa County).

Proposed Work (All Projects – fill-in)

PROPOSED WORK: The work consists of ……

Time (All Projects – fill-in)
(April 1, 1999)

CONTRACT TIME: The Contractor shall complete all work on the project within ____ calendar days after the Notice to Proceed has been issued.

Geotechnical Report (Include when a geotechnical report containing boring logs is available. Revised 5/03/01)

GEOTECHNICAL REPORT: A copy of the geotechnical report is available at the offices of the Maricopa County Department of Transportation. Any discrepancies between the boring log sheets and geotechnical report shall be referred to the Engineer for clarification. Information contained on the Soil Boring Data sheets and within the geotechnical report was obtained and used for foundation design purposes. It is the responsibility of the Contractor to establish soil information for their bid and construction purposes.

Section 102.6 Subcontractors' List (Include with all projects until the 2001 Supplement becomes effective. Revised 8/01/00)

102.6 SUBCONTRACTORS' LIST:

Section 102.6 Subcontractors' List of the Maricopa County Supplement to MAG is amended to read:

The Contractor shall submit to the County with the Bid documents, a listing of all major Subcontractors and Material Suppliers the Contractor intends to use in the performance of the work specified in this contract. In determining the amount of work assigned to each Subcontractor, the Contractor shall adhere to the mandates set forth in Section 108.2, Subsection E, of the MAG Uniform Standard Specifications.

Section 104.4, Partnering (Requested by Operations Div., Construction Admin. (5/11/99) to be included in all projects over $750,000 construction estimate – Allowance is not to exceed $5,000. Revised 7/10/00)

Section 104 is supplemented with the following:

104.4 PARTNERING:

The County intends to encourage the foundation of a cohesive partnership with the Contractor and its principal subcontractors and suppliers. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and completion within budget, on schedule, and in accordance with plans and specifications.

To implement this partner initiative, prior to starting of work and prior to the pre-construction conference, Contractor's management personnel and the County, through its authorized representatives, will initiate a partnering development seminar/team building workshop. Project personnel will make arrangements to determine attendees at the workshop, agenda of the workshop, duration, and location. Persons required to be in attendance will be the Engineer and key project personnel; the contractor's on-site project manager, and key project supervision personnel of both the prime and principal subcontractors and suppliers. The design engineers, FHWA, and key local government personnel will also be invited to attend as necessary.

Follow-up workshops may be held periodically throughout the duration of the contract as agreed by the Contractor and the County.

The establishment of a partnership charter on a project will not change the legal relationship of the parties to the contract, nor relieve either party from any terms of the contract.

The County will reimburse the Contractor, based upon approved invoices and documented expenses such as taxes or bond cost charges to Contractor in connection with the Item PARTNERING, an amount not to exceed the ALLOWANCE shown in the Bidding Schedule. Expenses, eligible for reimbursement are direct expenses incurred in providing facilities, facilitators, supplies, and materials for the seminar/team building workshops. No labor costs or additional mark-up for profit and/or fee for Contractor will be eligible for reimbursement.

Section 105.1 Authority of the Engineer (Include with all Projects. This information will be incorporated into the next MCDOT Supplement. Revised Dec 26, 2000)

105.1 AUTHORITY OF THE ENGINEER:

Section 105.1 is supplemented with the following:

The Engineer may adjust design grades or adjust the location of structures (especially drainage structures) prior to construction. Such adjustments are considered minor changes in the work and do not constitute extra work.

Section 105.6 Cooperation with Utilities (Use for All Projects – fill-in) (April 1, 1999)

105.6 COOPERATION WITH UTILITIES:

The following utilities are expected to be located within the limits of this project:

(Add Utility name, contact name and phone number here)

Section 105.12 Maintenance During Construction (Include with all Projects. This information will be incorporated into the next MCDOT Supplement. Revised Dec 26, 2000)

105.12 MAINTENANCE DURING CONSTRUCTION:

Section 105.12 is supplemented with the following:

The Contractor shall be responsible to protect the construction site, construction activities, and new construction from the detrimental effects of weather, including flooding, until acceptance by the Engineer.

Section 107.1.1.1 Contracting Requirements (Include with all projects until the 2001 Supplement becomes effective. Revised 1/18/01)

107.1.1.1 Contracting Requirements:

Delete ", and Telephone (602) 262-6790" from the second sentence of numbered paragraph 1.

Section 107.2.1 (Include if project <u>is</u> subject to NPDES requirements) (Revised 7/10/00)

107.2.1 NPDES CONSTRUCTION PERMIT REQUIREMENTS:

This project is subject to the National Pollutant Discharge Elimination System (NPDES) Stormwater requirements for construction sites under the Environmental Protection Agency (EPA) General Permit for Arizona.

The lump sum price for NPDES shall include all material, labor, and all other costs relating to the NOI, NOT, and the SWPPP. This includes but is not limited to the preparation, installation, maintenance, and removal of temporary SWPPP elements during project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events, runoff or releases on the project. The lump sum price for NPDES shall be inclusive of all costs, and no additional claims shall be made by the Contractor under any other specification provision of these documents, including changed conditions. Contractor shall be compensated for this bid item at a rate of 25% of the total bid item with the first progress payment, with the remaining 75% of the total bid item prorated over the entire length of the project.

Section 107.2.1 (Include if project <u>is not</u> subject to NPDES requirements. Revised April 1, 1999)

107.2.1 NPDES CONSTRUCTION PERMIT REQUIREMENTS:

This project is not subject to the National Pollutant Discharge Elimination System (NPDES) Stormwater requirements for construction sites under the Environmental Protection Agency (EPA) General Permit for Arizona.

Section 107.2.2 Corps of Engineers Section 404 Permit (Include if project is subject to 404 Permit requirements. Revised Sep. 14, 2000)

107.2.2 CORPS OF ENGINEERS SECTION 404 PERMIT

The Contractor shall fulfill all Permit terms and conditions, including 401 Certification conditions issued by the Arizona Department of Environmental Quality. The Contractor shall prepare draft copies of all required correspondence and electronically forward them to the Engineer for review and signature; the Contractor will be provided copies of all signed Permit correspondence.

Payment for 404 Permit Compliance will be made at the Contract Lump Sum Price. Payment shall be full compensation for performing all activities associated with fulfilling 404 Permit Compliance that are not directly included within other pay items.

All documents related to the Section 404 Permit are located in an Appendix to these Special Provisions.

[Include all 404 Related Documents within an appendix of the Contract Documents/Special Provisions.]

Section 111, Engineer's Office Facilities (Include if Type II Engineer's Office Facilities is not required. Choose appropriate sentence. Revised June 1, 2000)

SECTION 111 ENGINEER'S OFFICE FACILITIES

111.1 DESCRIPTION:

Type I Engineer Office Facilities will be required for this project.

No Engineer Office Facilities will be required for this project.

Section 112 On the Job Training (Include on all Federal Aid Projects: Bid Item 112.10000 Trainees, Approved Training Program; Units Hour; Unit Cost $0.80; Quantity is to be coordinated with Contracts. Contracts will add "On the Job Training" section to Contract Documents. Revised August 1, 2000)

Section 210, Borrow Excavation (Include if the project includes a bid item for Borrow Excavation. Revised April 1, 1999)

SECTION 210 BORROW EXCAVATION

210.4 MEASUREMENT
The first paragraph of Section 210.4 is revised to read:

Quantities will be computed by the average end area method, measured in the roadway prism, in place after compaction, in accordance with the Plans.

Section 211, Fill Construction (Include if fill construction is to be paid as Borrow Excavation or Channel Excavation. Revised November 16, 2000)

SECTION 211 FILL CONSTRUCTION

211.6 PAYMENT

This Section is revised to read:

Payment for all work under this Section will be made under Section 205 Roadway Excavation, Section 210 Borrow Excavation, or Section 215 Channel Excavation.

Section 302, Subgrade Preparation (This is a fill-in specification to be used for a stabilized penetrate and chip seal. Revised April 1, 1999)

SECTION 302, SUBGRADE PREPARATION FOR A STABILIZED PENETRATE AND CHIP ROAD

This section shall govern existing soil subgrade material, imported soil subgrade material or aggregate base material mixed with a soil stabilizer to form a stable base prior to the placement of prime coat, chip seal and fog seal. This item shall consist of a mixture of subgrade soil or base material, soil stabilizer and water and compacted at or near optimum moisture content.

Subgrade Preparation shall also include the preparation of subgrade, shoulders and ditches to the required lines and grades as shown on the plans or where required by the Engineer.

Any disposal area selected by the Contractor shall be approved by the Engineer prior to its use as such. Disposal of waste in approved areas shall be made in such a manner that natural drainage will not be blocked or diverted unless requested by the Engineer.

302.1 MATERIALS:

Soil stabilizer such as ---------, manufactured by ----------, or an approved equal shall be used. Water shall comply with Section 225 of the Uniform Standard Specifications. The soil for the mixture shall consist of the subgrade material existing in the roadway or approved import material or aggregate base. The material shall not contain more than 5 percent gravel or stone retained on a 3 inch sieve (75 mm sieve)

It shall be demonstrated by laboratory tests that characteristics of the soil will be adequately modified by the specified Stabilizer content.

302.2 EQUIPMENT:

An ample number of machines, combination of machines and equipment shall be provided and used to produce the completed stabilized base meeting the requirements for soil pulverization/scarification, mixing, stabilizer distribution, water application, incorporation of materials, compaction, finishing, grading and shaping as provided in these specifications.

302.3 CONSTRUCTION METHODS:

Before undertaking construction of the stabilized soil subgrade or base, the area to be stabilized shall be compacted to a minimum of 90%, in accordance with ASTM D-698A, true to line and grade as requested by the Engineer or as shown on the plans. During this process any unsuitable soil material, including excess material retained on a 3 inch (75 mm) sieve, shall be removed and replaced with acceptable material. The compacted surface shall be at the proper elevation as specified, shown on the plans, or as requested by the Engineer, for the top of stabilized subgrade or base. At completion of this phase, the material and surface shall be approved by the Engineer before proceeding.

The soil or base material shall be scarified, pulverized, mixed with water and stabilizer, compacted and finished in lengths permitting the full roadway width to be completed in the time period specified by the soil stabilizer supplier, if any. Such lengths will generally be not less than ½ mile (.80 km) for 30 foot (9.1 meter) road width, per day.

302.3.1 Pulverizing: Before application of stabilizer, soil or base to be processed shall be scarified to a minimum depth of 6 inches, or the depth specified on the plans. The material shall be damp at the time of scarifying to reduce dust to a minimum and to aid in pulverization. If the soil contains clods, it shall be pulverized until not less than 80 percent, exclusive of gravel or stone, will pass a No 4 sieve (4.75 mm).

302.3.2 Application of Stabilizer: The quantity of stabilizer shall be by gallons per mile (liters per kilometer) of roadway soil as determined by the laboratory and/or as requested by the Engineer and shall be applied uniformly on the soil in a manner satisfactory to the Engineer, preferably the stabilizer will be diluted with water in a water truck and be applied by sprinkling with tank trucks equipped with pressurized spray bars and suitable apparatus. One mile (kilometer) of roadway is defined as one mile (kilometer) long by 30 feet (9.1 m) wide by 6 inches (150 mm) deep, or the depth specified on the plans. The entire operation of spreading and mixing shall be conducted in such a manner as will result in a uniform soil or base, stabilizer and water mixture for the full design width and depth. The percentage of moisture in the soil or base, at the time of stabilizer water solution application, shall not exceed the quantity that will permit a uniform and intimate mixture of the soil and stabilizer during mixing operations.

302.3.3 Mixing: Mixing with addition of water as required shall be continued until the product is uniform in color and at or near optimum moisture content. The mixed material shall be kept at the specified moisture content up to and during compaction.

302.3.4 Optimum Moisture: Optimum moisture requirements and field tests of moisture density shall be determined in accordance with AASHTO T- 99, T- 191, T- 217, or ASTM D-698, D- 2922, D- 3017 on representative samples of soil/base - stabilizer mixture obtained from the area being processed. At the time of compaction, the moisture content shall be within $\pm$ 4 percent of optimum but not greater than that quantity which will cause the subgrade material to become unstable during the compaction and finishing process.

302.3.5 Compaction: After mixing is complete, the mixture shall be carefully placed in a uniform loose depth which will provide a surface true to grade and section when compacted. Unless otherwise requested by the Engineer, initial compaction shall be by means of a tamping, grid, or pneumatic roller. After the tamping roller has partially walked out, pneumatic rollers shall be used. Finish rolling with a smooth steel wheel. Density of final product shall be not less than 95 percent of maximum as determined by AASHTO or ASTM as specified above.

302.3.6 Finishing: As compaction nears completion, the surface of the subgrade shall be shaped to required lines, grades and cross-section. When required, the surface shall be lightly scarified with spike tooth harrows or other approved equipment to remove imprints left by equipment. The completed subgrade shall not vary more than ½ inch (13 mm) in thickness and

not more than 1/4 inch (6.5 mm) above or below required grade and cross-section. It shall be free of surface cleavage planes, cracks, or loose material. As a final operation, the surface shall be very lightly scalped with a motor grader, moistened with a water fog spray and rolled with a pneumatic roller as requested by the Engineer.

302.3.7 Deficiency: When in the opinion of the Engineer there is a reason to believe that a deficiency in thickness exists, sections will be dry sawcut or other approved method to determine the thickness. If there is a deficiency, the complete subgrade preparation process will have to be repeated to the proper depth from scarification at no additional cost to the Contracting Agency.

302.3.8 Maintenance: The Contractor shall maintain the surface until it has been covered with the designated bituminous wearing course. Minor surface pits may be filled with compacted bituminous surfacing, if authorized by the Engineer. Immediately prior to the placing of the bituminous prime coat, the surface shall be very lightly scalped with a motor grader to remove all loosened material from the surface.

302.4 Measurement:

Measurement of the stabilized subgrade will be by the square yard (square meter) constructed to the required depth, completed and accepted.

Measurement of the stabilizer will be by the number of gallons (liters) or tons (tonnes) (concentrate) mixed with the subgrade soil/base.

302.5 Payment:

Payment will be made for the applicable items at the contract unit prices bid in the proposal, and shall constitute full payment for furnishing all material, equipment, tools, labor, and incidentals necessary to complete the work and for carrying out the maintenance provisions.

The cost of water and watering will be included in the price bid for the construction operation.

No measurement or payment will be made for any imported earth materials unless they are required for fill and then they will be measured and paid for in accordance with Section 211 of the Uniform Standard Specification.

Section 308, Lime Slurry With Fly Ash Stabilization (Include in projects when lime slurry with fly ash is used for subgrade stabilization. When this section is used also include GSP Section 333 Fog Seal Coats. Revised 12/04/2000)
This specification is anticipated to be added to the next edition of the MCDOT Supplement of the MAG Specifications.

SECTION 308 LIME SLURRY WITH FLY ASH STABILIZATION

308.1 Description
This section shall consist of constructing a mixture of soil, lime slurry, fly ash and water for the stabilization of soils or base materials. The work shall be performed in conformity with the lines, grades, thickness, and typical cross sections shown on the plans.

308.2 Materials

308.2.1 Soil or Subgrade
The soil or subgrade material used for this work shall consist of materials on the site or imported and shall be free of roots, sod, weeds, and stones larger than 75 millimeters (3 inches).

308.2.2 Quicklime and Hydrated Lime
Lime used to manufacture the Commercial Lime Slurry specified herein, shall be either Quicklime or Hydrated lime and shall conform to the requirements of ASTM C 977. Lime may only be used in the production of lime slurry. The direct use of dry hydrated lime or quicklime to the soil material is strictly prohibited. All lime shall come from a single source. If a source change is requested, a new mix design shall be submitted using lime from the proposed new source. The new design must be approved by the Engineer prior to use.

308.2.3 Commercial Lime Slurry
Commercial lime slurry shall be a pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity naturally injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of solids content, shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition and residue.

(A) Chemical Composition: The solids content of the lime slurry shall consist of a minimum of 90 percent by weight, of calcium and magnesium oxides (CaO and MgO), as determined by ASTM C-25.

(B) Residue: The percent by weight of residue retained in the solids content of lime slurry shall conform to the following requirements:

Residue retained on a 3.35 mm (No. 6) sieve	Max. 0.2%
Residue retained on a 600 µm (No. 30) sieve	Max. 4.0%

(C) Grade: Commercial lime slurry shall conform to a dry solids content as approved by the Engineer.

A certificate of compliance and a field summary of lime slurry produced shall be provided to the Engineer for each load of slurry.

308.2.4 Water
Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the suggested requirements of AASHTO T-26. Water known to be of potable quality may be used without test.

308.2.5 Fly Ash
Fly ash shall meet the requirements of AASHTO M-295, Class C.

308.3 Mix Design
Before commencing lime / fly ash treatment work, the Contractor shall submit for approval by the Engineer, a proposed mix design. A testing laboratory under the direction and control of a registered Professional Engineer shall prepare the proposed mix design. The mix design shall be determined using the soils or subgrade material to be stabilized and lime and fly ash from the proposed suppliers and shall determine the following:

Percent of fly ash and rate of application.
Percent of lime and rate of application of lime slurry in the treated soil or subgrade material.
Optimum water content during mixing, curing and compaction.
Gradation of in-situ mixture after treatment.
Additional mixing or equipment requirements.
Mellowing time requirements, if needed.

The mix design shall comply with the following requirements:

Plasticity Index: Less than 3, per AASHTO T-89 & 90.
Swell Potential: One (1) percent or less vertical expansion of an air dried soil when inundated with water and allowed to swell at a confined pressure of 2.88 kPa (60 psf).
Unconfined Compressive Strength: Minimum 2070 kPa (300 psi) in five days curing at 38°C (100ºF) when tested in accordance with ASTM D-1633 Method A.

308.4 Construction

308.4.1 General
The completed subgrade shall consist of a uniform lime / fly ash mixture, free from loose segregated areas, have a uniform density and moisture content, and be well bound for its full depth. A smooth surface suitable for placing subsequent courses is required if pavement is to be placed directly on the treated subgrade.

Prior to beginning stabilization, the subgrade shall be constructed and brought to grade and shall be shaped to conform to the typical sections, lines, and grades as shown on the plans.

When the design requires treatment to a depth greater than 300 mm (12 inches), the subgrade soil shall be treated in equal layers. The top layer(s) of soil shall be removed and stockpiled. The lower layer of soil to be treated shall then be treated and allowed to cure in place. After final mixing, the lower layer shall be compacted in maximum 300 mm (12 inches) compacted lifts. The stockpiled soil shall then be placed, treated, mixed and compacted in successive maximum 300 mm (12 inches) compacted lifts.

308.4.2 Weather Limitation
Lime slurry / fly ash treated subgrade shall not be constructed if the atmospheric temperature is below 4.5°C (40ºF) or when conditions indicate that temperatures may fall below 4.5°C (40ºF) within 24 hours.

308.4.3 Equipment
Contractor shall provide all equipment necessary to complete the work, including grading and scarifying equipment, lime slurry spreader (gravity feed spreaders will not be permitted), fly ash spreader, mixing and pulverizing equipment, sheepsfoot and pneumatic rollers, sprinkling equipment, and trucks. When using dry hydrate to make slurry, agitators are mandatory in spreader. All equipment used for this work shall be subject to approval by the Engineer.

308.4.4 Application
Lime slurry and fly ash slurry shall be spread only on that area where the mixing operations can be completed during the same working day. The application and mixing of lime and fly ash with the soil shall be accomplished by the methods hereinafter described as Slurry Placing.

Slurry Placing: Fly ash shall be spread with trucks equipped with an approved distribution system on the prepared subgrade at the rate specified by the job mix design in a single pass, just prior to the application of the lime slurry. The fly ash may be added to the lime slurry and placed together, if approved by the Engineer. Lime slurry / Lime slurry fly ash, shall be mixed in a portable mixing unit and spread with trucks equipped with an approved distribution system as a slurry. Commercial lime slurry shall be applied with a lime percentage not less than specified herein. The distribution of lime slurry shall be attained by successive passes over a measured section of subgrade until the proper amount of lime has been spread, as determined in the job mix design. The rate of application shall be verified using ASTM D-3155 methods.

Thickness: The thickness of the lime slurry treated subgrade shall be determined by visual inspection and/or by depth tests taken at intervals so that each test shall represent no more than 836 square meters (1000 square yards) per layer, if more than one layer. The method used to remove material to determine depth of lime treatment may be by shovel and/or pick, coring or other method approved by the Engineer. Phenolphthalein solution shall be used to detect the presence of lime. When the grade deficiency is more than 25 mm (1 inch), the Contractor shall correct such areas in a manner satisfactory to the Engineer. Contractor shall replace, at no cost to the Agency, the material where depth tests are taken.

No traffic other than the mixing equipment will be allowed to pass over the spread of lime slurry until after completion of mixing.

308.4.5 Mixing
The full depth of the treated subgrade shall be mixed with an approved mixing machine. The use of disc plows or blades are prohibited except in areas specified by the engineer. To insure a complete chemical reaction of the lime, fly ash and soil or subgrade, water shall be used as required to maintain a moisture content at or above the optimum prior to beginning compaction and held above optimum during compaction. During the interval of time between application and mixing, lime that has been applied, unmixed and exposed to the open air for 10 hours or more will not be accepted.

After mixing and prior to compaction, clay lumps shall meet the following criteria:

	Percent (by Weight)
Minimum of clay lumps passing 37.5 mm (1½ inch) sieve	100
Minimum of clay lumps passing 4.75 mm (No. 4) sieve	60

308.4.6 Compaction
Compaction of the mixture shall begin after final mixing. Sheepsfoot or segmented steel rollers shall be used during initial compaction. Steel wheel or pneumatic tired rollers shall be used only during final compaction, if pavement is to be placed directly on the treated subgrade. Areas inaccessible to rollers shall be compacted to the required density by methods approved by the Engineer.

The material shall be aerated or watered as necessary to provide and maintain required moisture content. The field density of the compacted mixture shall be a least 95 percent of the maximum density at 0-4 percent above optimum moisture. A composite of treated soil or subgrade materials from a minimum of five (5) random locations, per soil type, within the area to be stabilized shall be used to determine the maximum density and optimum moisture content in accordance with ASTM D-558. The in-place field density shall be determined in accordance with ASTM D-1556, ASTM D-2167 or ASTM D-2922.

After each section is completed, tests will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked to meet requirements.

If pumping subgrade should become evident at any time prior to paving, the Engineer may require proof rolling with a pneumatic-tire roller or other approved equipment in order to identify the limits of the unacceptable area. The proof rolling will be performed at no additional cost to the Contracting Agency.

All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required, and reshaping and recompacting. The surface of the course shall be maintained in a

smooth condition, free from undulations and ruts. Compaction and finishing shall be done in such a manner as to produce a smooth dense surface free of compaction planes, cracks, ridges, or loose materials.

Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion, shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades. Should the material, due to any reason or cause, lose the required stability, density, and finish before the next course is placed or the work is accepted, it shall be recompacted and refinished at no cost to the County.

308.4.6.1 Tolerances
At final compaction, the lime, fly ash and water content for each course of subgrade treatment shall conform to the approved mix design with the following tolerances.

Material	**Tolerance**
Lime	+0.5% of design, (ASTM C-114)
Fly Ash	±1.0% of design, (ASTM C-114)
Water	+4%, -0% of optimum, (ASTM D-698)

308.4.7 Finishing and Curing
After the final layer or course of lime slurry / fly ash treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the plans. The completed section shall then be finished by rolling with a pneumatic or other suitable roller.

The final layer of lime slurry / fly ash treated subgrade shall be maintained in a moist condition until the next layer of pavement structure is placed. If required, a fog seal for curing, in compliance with Section 333, shall be furnished and applied to the surface of the final layer of the lime stabilized material as soon as possible after the completion of final rolling and before the temperature falls below 4.5°C (40ºF). Curing seal shall be applied at a rate between 0.45 and 0.90 liters per square meter (0.10 to 0.20 gallons per square yard) of surface. The exact rate will be determined by the Engineer.

After curing begins, all traffic, except necessary construction equipment shall be kept off the lime slurry / fly ash stabilized subgrade for a minimum of 7 days or until the final pavement structure layer(s) are placed.

308.4.8 Maintenance
The Contractor shall maintain, at his / her own expense, the entire lime slurry treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the Engineer.

308.5 Measurement
The quantity of lime slurry / fly ash treated soils shall be measured by the square meter (yard), measured in place, treated, compacted, to the proper depth, and accepted.

The quantity of curing seal shall be measured by the tonne (ton), diluted.

308.6 Payment
The lime slurry / fly ash treated soils measured as provided above, will be paid for at the contract price per square meter (yard), which price shall be full compensation for the item complete in place, as herein described and specified.

Payment for curing seal will be made at the contract price per tonne (ton) for Fog Seal (Contingent Item) based on the rate of application as requested by the Engineer.

Section 310, Untreated Base (Include when final pay quantities are based on use of scale weight tickets. This information will be added to the next MCDOT Supplement. Revised Feb 23, 2001)

SECTION 310 UNTREATED BASE

Section 310 is supplemented with the following:

Aggregate base shall conform to the requirements of Section 702 of the Uniform Standard Specifications. Aggregate base shall be crushed in accordance with Section 702.2.

The Contractor shall furnish the Engineer certified weight tickets for the aggregate base (AB) placed on the project. Final pay quantities for aggregate base will be based upon the scale tickets submitted to the Engineer for aggregate base specifically used to construct roadway untreated base as shown in the contract documents.

Section 312, Cement Treated Base (Include when it is necessary to include the cement content by weight. Revised April 1, 1999)

SECTION 312 CEMENT TREATED BASE:

Section 312 is supplemented with the following:

Cement treated base may be mixed in either a traveling plant or in a stationary plant at the option of the Contractor. If transit mixers are to be used, the type of mixer must be approved by the Engineer.

The amount of cement to be used shall be _____ percent by weight of the dry aggregate or as required by the Engineer. Aggregate for Cement Treated Base shall conform to the requirements of Section 702.

The Cement Treated Base shall be cured in accordance with Section 312.6 except that a bituminous curing seal shall not be used. Contractor shall keep the surface of the compacted base continuously moist until overlaid.

Section 315, Bituminous Prime Coat (Include if a bituminous prime coat may be required. Revised April 1, 1999)

SECTION 315 BITUMINOUS PRIME COAT (CONTINGENT ITEM)

The bituminous material shall be Grade MC-70 or MC-250 liquid asphalt (*70 cold weather, 250 hot weather*) as determined by the Engineer. Prime coat shall be applied to the total width of the prepared subgrade at the rate of 1.67 l/m^2 (0.4 gallon per square yard) unless otherwise specified by the Engineer. Prime Coat shall be allowed to penetrate for not less than 48 hours prior to beginning chip seal pavement. An application of dry or slightly damp chips may be placed over the penetration coat to allow traffic to use the roadway prior to the chip seal. Prior to chip seal the roadway shall be swept.

Section 317, Asphalt Milling (Include if asphalt milling is required. This information will be added to the next MCDOT Supplement. Revised June 1, 2000)

SECTION 317 ASPHALT MILLING

Section 317 is supplemented with the following:

The Contractor shall be responsible for continually checking the milling operation to determine that the proper depth of milling has been achieved, that the proper profile and cross slope are achieved, and that the surface texture is (a) free from longitudinal ridges, and (b) has a uniform pattern. The Contractor shall achieve a change in resulting surface by varying the forward speed of the milling machine or the speed of the mandrel.

Section 321, Asphalt Concrete Pavement (Include when asphalt paving is required. This information will be added to the next MCDOT Supplement. Revised March 22, 2001)

SECTION 321 ASPHALT CONCRETE PAVEMENT

Section 321.3 is supplemented with the following:

Asphalt concrete of less than 50 mm (2”) in thickness shall be placed only when the atmospheric temperature in the shade is 13ºC (55°F) or above.

Section 325, Asphalt Rubber Overlay, Open Graded (Include if asphalt rubber overlay is required. This information will be added to the 2001 MCDOT Supplement. Revised Apr 2, 2001)

SECTION 325 ASPHALT-RUBBER OVERLAY, OPEN GRADED

Section 325.2.3 Job-Mix Formula is revised as follows:

Change the **Asphalt Rubber Binder** subsection of **Production Tolerance** to read:

> **Asphalt Rubber Binder:**
> The single test tolerance for Asphalt Rubber Binder Content is ±0.4 % of the approved binder content when tested in accordance with AASHTO T308.

Change the section titled **TESTING** to read:

> **TESTING:**
> Contractor shall have an ignition furnace and related testing apparatus conforming to requirements of AASHTO T308, and a qualified operator available at all times at the plant or on the project site to perform tests, when requested by the Engineer. As a minimum, ignition binder content shall be determined by the Contractor's qualified technician once per each 1/2 day production and as requested by the Engineer.

Add the following to Section 325.2.3 following the revised section titled **TESTING**:

> **CALIBRATION FACTORS**
> A minimum of one week prior to the production of asphalt rubber hot mix, the Contractor shall submit to the Engineer all hot mix materials that will be used on the project. The materials shall be used to determine the calibration factors using the Contractor supplied ignition furnaces and related test equipment. Split samples shall be used by the Contractor to conduct calibration test under the observation of the Engineer. Calibration factors shall be recalculated whenever a change in the asphalt rubber hot mix materials occurs and when requested by the Engineer.

Section 325.4 Construction Methods is supplemented with the following:

Asphalt-rubber concrete shall be placed only when the surface is dry, and when the atmospheric temperature in the shade is 13º C (55º F) or above. No asphalt-rubber concrete shall be placed when the weather is foggy or rainy. Asphalt-rubber concrete shall be placed only when the Engineer determines that weather conditions are suitable.

Section 330, Asphalt Chip Seal (Include in projects requiring a two day waiting period between placement of the prime coat and chip seal coat. Revised April 1, 1999)

SECTION 330 ASPHALT CHIP SEAL

This item shall fully comply with Section 330 of the Uniform Standard Specifications except that the application of the chip seal coat shall not begin before two days after the application of the prime coat.

The emulsified asphalt shall be grade RS-2h or CRS-2h and shall fully comply with Section 713 of the MAG Uniform Standard Specifications. Application shall be at the rate of 0.40 gallons per square yard (1.67 liters per meter^2) unless otherwise specified by the Engineer.

The stone chips shall fully comply with Section 716 of the Uniform Standard Specifications except precoating is not required and gradation shall be as follows:

TABLE 716-1
For Low Volume Traffic Only

Sieve Size	% Passing
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	97-100
1/4 in. (6.3 mm)	65-100
No. 8 (2.3 mm)	0-10
No. 200 (.075 mm)	0-1

Application shall be at the rate of approximately 14.12Kg per meter^2 (26 pounds per square yard).

Payment for this item will be made at the contract unit price bid per tonne (ton) for Liquid Asphalt for Chip Seal (RS-2 OR CRS-2h) and for Stone Chips.

Section 333, Fog Seal Coats (Include in projects when lime slurry with fly ash is used for subgrade stabilization. This section is to be used with GSP Section 308 Lime Slurry With Fly Ash Stabilization. Revised 9/12/2000)

SECTION 333 FOG SEAL COATS

Section 333.1 is supplemented with the following:

Fog seal coats for curing seal purposes as specified in Section 308 or Section 309 shall consist of the application of emulsified asphalt.

Section 333.6 is supplemented with the following:

For curing seal applications over Lime Slurry Stabilization or Lime Slurry with Fly Ash Stabilization the application rate shall be between 0.45 and 0.90 liters per square meter (0.10 to 0.20 gallons per square yard).

Section 337, Price Adjustment for Bituminous Materials (Include in projects when asphalt prices may significantly fluctuate between the bid date and date of actual use. Requires identification of effected bid items. Revised November 13, 2000)

SECTION 337 PRICE ADJUSTMENT FOR BITUMINOUS MATERIALS

337.1 Description

Price adjustment shall be calculated based on price changes of bituminous material occurring between the date of bid opening and the date that the material is delivered or used. Price adjustment shall be bi-directional, potentially increasing or decreasing contract payments.

The term “bituminous material” as used herein shall include asphalt cement, liquid asphalt and emulsified asphalt and shall apply only to the following specific pay items requiring these materials: *[List all asphalt based bid items in project – verify list.]* Bituminous Prime Coat, Asphalt Concrete Pavement, Bituminous Tack Coat, Rubberized Asphaltic Concrete Pavement, and Fog Seal (Contingent Item).

The contract unit price for each item of bituminous material shall include all costs for furnishing, hauling, handling, spreading, and mixing of the material required, including the “initial cost” of bituminous material and all applicable taxes, bonds, and insurance premiums; but excluding any difference in the cost of bituminous material that occurs between the date of bid opening and the date that the material is delivered or used and the cost of taxes, bonds and insurance directly attributed to the price adjustment amount for bituminous materials.

337.2 Measurement

Asphaltic Concrete

The approved mix design designates a range of bituminous material allowable for construction. If the amount of bituminous material exceeds the allowable range, the Contractor will not be compensated for the excess bituminous material. If the bituminous material is less than the allowable range and the asphalt concrete is found to be acceptable by the engineer, the bituminous material shall be subject to the price adjustment.

The tonnes (tons) of bituminous materials, which are present in asphalt concrete, shall be determined by tests using nuclear asphalt content gauge, extraction, ignition furnace, or other approved method. Tests shall be taken at least twice daily on a random basis. When only two tests are planned, they shall occur at placement of approximately 33% and 67% of the day's planned quantity. The arithmetic average of each day's bituminous testing that is found to be within or below the allowable range will be used to determine the amount of bituminous material present in the mix. If only one test is taken, the amount of bituminous material present in that sample will be used. The monthly production shall be the sum of the daily production.

Tack Coat, Prime Coat, Fog Seal Coat

The tonnes (tons) of emulsified products to which the adjustment will be applicable will be the tonnes (tons) of the emulsified bituminous asphalt prior to dilution. The Contractor shall weigh the truck prior to and after placing the emulsion and will be paid based upon the difference in the weight.

337.3 Payment

The "initial cost" of asphalt cement, liquid asphalt and emulsified asphalt will be the monthly cost determined by the Arizona Department of Transportation (ADOT) based on selling prices of asphalt cement published by the Asphalt Weekly Monitor, a publication by Poten & Partners, Inc.

The bituminous material "initial cost" price is issued each month in memorandum form by ADOT's Contract and Specifications Section of the Intermodal Transportation Division under "Price Adjustment for Bituminous Material" title. The price is the arithmetic average of the high and low selling prices for asphalt cement shown for the previous month in the Asphalt Weekly Monitor for the Arizona/Utah and Southern California regions.

This price will be deemed to be the "initial cost" for bituminous material of all types, grades, etc., on projects on which bids are opened during the following month. This price may also be obtained from the MCDOT procurement office, (602) 506-8647.

For each item of bituminous material for which there is a specific pay item, an adjustment in compensation will be made for either an increase or decrease in the price of asphalt cement as shown in the ADOT memorandum, current for the date of use of the material, as compared to the "initial cost".

Adjustments in compensation for emulsified asphalt will be made for the bituminous material prior to dilution.

The tonnes (tons) of Bituminous Material (Asphalt Rubber) to which the adjustment will be applicable will be 0.80 multiplied times the total quantity of the item used. The adjustment will not apply to the twenty (20) percent of the material that constitutes the rubber additive.

The tonnes (tons) of bituminous materials which are paid for on an invoice basis to which the adjustment will be applicable are the tonnes (tons) which have been delivered to the project and subsequently incorporated into the work. The adjustment will be applicable on the date of use of the bituminous material.

The Contractor's Price Adjustment for Bituminous Materials shall include an adjustment for the actual change in cost of premiums on required payment and performance bonds, the actual change in cost of premiums for property damage and/or public liability insurance, and the change in sales tax (identified in Section 109.2.3) liability incurred as a result of the price adjustment for bituminous materials. The Contractor shall provide documentation to determine the adjustment for the actual change in cost of premiums on required payment and performance bonds, property damage and/or public liability insurance, and sales tax.

No additional compensation will be made for any additional or increased charges, costs, expenses, etc., which the Contractor may have incurred since the time of bidding and which may be the result of any increase in the "initial cost" of bituminous material.

The cost adjustment for the amount paid corresponding to items governed by this provision will be made in the next regular monthly progress payment following actual use or application of the bituminous material and may cause an increase or decrease in payments.

Section 401, Traffic Control (Include with all Projects. This information will be incorporated into the next MCDOT Supplement. Revised Aug 22, 2000)

SECTION 401 TRAFFIC CONTROL

Revise Sections 401.5.4 and 401.5.7 to read as follows:

401.5.4

An appropriate regulatory speed limit sign shall be used where traffic is maintained on temporary detour roads, diversions, or on traffic lanes that are severely restricted.

401.5.7
Contractor shall use portable concrete barrier when there is an excavation, construction hazard, or when requested by the Engineer. Contractor shall design and erect portable concrete barriers in accordance with Chapter 9 of the AASHTO Roadside Design Guide. Open excavations and trenches within 3 meters (10 feet) of an active traffic lane shall be protected at night and during non-working days from vehicle traffic by steel plating or the use of portable concrete barriers.

Section 415, Flexible Metal Guardrail (Include in projects that require reconstruction of existing guardrail or construction of guardrail from salvaged material. Revised June 1, 2000)

SECTION 415 FLEXABLE METAL GUARDRAIL

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add:

Section 415.1 Description:

The work shall also consist of reconstructing existing guardrail, or constructing guardrail from salvage, in accordance with the standard details or the details shown on the project plans, and as per the requirements of these specifications.

This item shall also include all the work and materials to delineate guardrail sections being reconstructed, or constructed from salvage This item shall also include all the work and materials to delineate guardrail sections.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add:

Section 415.3.6 Construct Guardrail From Salvage:

Salvaged guardrail, guardrail terminals, guardrail transitions, end terminal assemblies and other guardrail systems, shall be constructed at the locations shown on the project plans and in accordance with the provisions specified herein for new guardrail.

If any salvaged materials are deemed by the Engineer, to be unsuitable for reuse, or if the quantities of salvaged materials are insufficient to complete the work, the contractor shall furnish new materials in sufficient quantities to complete the work and the cost of furnishing such materials will be paid for in accordance with the provisions of the project contract.

Where new boltholes in rail elements are required, the holes shall be made by drilling or punching. Flame-cut boltholes will not be permitted.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add:

Section 415.3.7 Reconstruct Guardrail:

Existing guardrail, guardrail terminals, guardrail transitions, anchor assemblies, end terminal assemblies, and other guardrail systems, shall be removed and reconstructed at the locations shown on the project plans, and in accordance with the provisions specified herein for new guardrail.

When reconstruct guardrail is specified, posts shall be completely removed and then reconstructed. When guardrail anchor assemblies are removed, the existing concrete foundation shall be fully removed and the void backfilled with moist soil in compacted lifts, per Section 415.3.2 Roadway Guardrail paragraph 3.

New foundation tubes shall be installed in place of guardrail anchors for all anchor assemblies that are to be reconstructed.

All guardrail components requiring removal shall be removed in such a manner as to prevent damage to and minimize the loss of the components.

If any materials designated for reconstruction are deemed by the Engineer to be unsuitable for reuse or if the quantities of existing materials are insufficient to complete the work, the contractor shall furnish new materials in sufficient quantities to complete the work and the cost of furnishing such materials will be paid for in accordance with the provisions of this contract.

Items designated to be reused, which are lost, damaged or destroyed as a result of the contractor's operations, shall be repaired or replaced by the contractor at no additional cost to the County.

Existing post, blocks, rail elements or hardware which are not required for guardrail reconstruction or which the Engineer deems unsuitable for reconstruction, shall be removed and disposed of as requested by the Engineer.

Where new boltholes in rail elements are required, the holes shall be made by punching or drilling. Flame-cut boltholes will not be permitted.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add.

Section 415.4.5 Constructing Guardrail From Salvage:

Constructing the various types of guardrail from salvage will be measured by the linear meter (foot) or by the unit each, using the limits of measurement specified for new construction.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add.

Section 415.4.6 Reconstruction Of Guardrail:

Reconstructing the various types of guardrail will be measured by the linear meter (foot), or by the unit each, using the limits of measurement specified for new construction.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add.

Section 415.5.5 Construct From Salvage:

The accepted quantities of construct guardrail from salvage, measured as provided above, will be paid for at the contract unit price, complete in place, including excavation, backfill and disposal of surplus or unusable materials.

The contractor will be paid in accordance with the provisions of the contract for furnishing new posts, blocks, rail elements or hardware to replace components deemed by the Engineer unsuitable for reuse, or to supplement insufficient existing quantities for reconstructing the various types of guardrail from salvage.

MCDOT Supplement to MAG Uniform Standard Specifications is Modified to add.

Section 415.5.6 RECONSTRUCT GUARDRAIL:

The accepted quantities of reconstruct guardrail, measured as provided above, will be paid for at the contract unit price, complete in place, including excavation, backfill and disposal of surplus or unusable materials.

The contractor will be paid in accordance with the provisions of the contract for furnishing new posts, blocks, rail elements or hardware to replace components deemed by the Engineer unsuitable for reuse, or to supplement insufficient existing quantities for reconstructing the various types of guardrail from salvage.

Section 502 Drilled Shaft Foundations (Include when drilled shaft foundations are part of the project. This information will be incorporated into the next MCDOT Supplement. Revised Feb 14, 2000)

SECTION 502 DRILLED SHAFT FOUNDATIONS

Delete Section 502.1.2 Certification.

Revise the first paragraph of Section 502.1.3 to read as follows:

502.1.3 Installation Plan: The Contractor shall submit to the Engineer, for review and approval, a detailed Installation Plan. The Installation Plan shall be based on available

geotechnical information. To assist in plan evaluation and upon request by the Engineer, the Contractor shall provide copies to the Engineer of the geotechnical information used to develop the Installation Plan. The Installation Plan shall contain the following information:

Section 420 Chain Link Fence (Include in projects with a bid item for Chain Link Bridge Fence – PER ADOT STD. DWGS. B-22.50, 22.60, AND 22.70. Revised June 1, 2000)

Section 420 is supplemented with the following, specifically for the construction of Chain Link Bridge Fence:

420.1 Description: This work shall consist of the fabrication and installation of Chain Link Bridge Fence, including all accessories, on reinforced concrete bridge decks, curbs, parapets, and barriers, and as required on other concrete structures and structural elements, in conformance with the Specifications, this Supplement, the Construction Special Provisions, and the Project Plans. Details of the Chain Link Bridge Fence shall generally conform to the appropriate requirements of the current Arizona Department of Transportation (ADOT) Standard Drawings:

- B-22.50 "Pedestrian Fence Details with Curb",
- B-22.60 "Pedestrian Fence Details with Parapet", and/or
- B-22.70 "6'-0" High Fence Details with Parapet or Barrier",

as specified in the Construction Special Provisions or as indicated on the Project Plans.

420.3 Construction:

420.3.1 Fence Construction: Chain Link Bridge Fence shall be fabricated and installed in accordance with Shop Drawings submitted by the Contractor and approved by the Engineer, in accordance with the requirements of Subsection 105.2. The Contractor shall not initiate fence fabrication until the Shop Drawings are approved.

Expansion Joints in the bottom and intermediate rails shall be spaced at intervals not greater than 40 feet (12 meters), or as detailed on the Project Plans. All expansion joints shall utilize an external pipe/tube sleeve of the same material as the rails; external sleeve size shall be sufficient to permit the expansion joint to function freely. Expansion Joints shall not be installed in the top rail of Chain Link Bridge Fence.

420.4 Measurement: Chain Link Bridge Fence will be measured on the fence line along the bottom rail, from center to center of end posts.

Section 505.6.4, Longitudinal Joints between Precast Bridge Deck Members
(Include in projects with longitudinal joints between precast bridge deck members. This section is to be used with section 506.9.1.)
The attached specification has not been reviewed by Mr. Wojakiewicz. Comments and questions are much encouraged.
(June 1, 2000)

SECTION 505 CONCRETE STRUCTURES

Section 505 of the MCDOT Supplement is supplemented with the following:

505.6.4 Longitudinal Joints between Precast Bridge Deck Members is deleted in its entirety. It is replaced with the following new Subsection in Section 506:

Section 506.9.1, Longitudinal Joints between Precast Bridge Deck Members
(Include in projects with longitudinal joints between precast bridge deck members. This section is to be used with section 505.6.4.)
The attached specification has not been reviewed by Mr. Wojakiewicz. Comments and questions are much encouraged.
(June 1, 2000)

SECTION 506 PRECAST PRESTRESSED CONCRETE MEMBERS

Section 506 is supplemented with the following:

506.9.1 Longitudinal Joints between Precast Bridge Deck Members:

(A) General: All bridge superstructures comprised of longitudinal precast prestressed concrete bridge deck members (box beams, voided slabs, and slab units) with deck overlay wearing surfaces shall be laterally connected with transverse tensioning rod systems, and the longitudinal shear key joints packed with grout, prior to placing the overlay wearing surface, unless specified otherwise in the Project Plans or the Construction Special Provisions.

(B) Transverse Tensioning Rod Systems: The components of transverse tensioning rod systems shall conform to the following requirements:

- Quenched and Tempered Steel Rods/Bars ASTM A 449
- Heavy Hex Nuts (Grade DH) AASHTO M 291 (ASTM A 563)
- Hardened Steel Washers AASHTO M 293 (ASTM A 436)
- Mild Steel Anchor Plates AASHTO M 183 (ASTM A 36)

or as approved by the Engineer.

All transverse tensioning rod systems shall use 7/8” (22.2mm) diameter bars placed through 2 1/2” (63.5mm) diameter precast horizontal holes in deck member internal diaphragms, unless specified otherwise in the Project Plans or the Construction Special Provisions. All tension rod splices shall use threaded couplers; welding will not be used

to splice transverse tension rods. Threaded couplers shall develop the tensile strength of the threaded rod/bar, as specified under Tensile Load in Table 3 of ASTM A 449.

Transverse tensioning rods shall be galvanized in accordance with AASHTO M 111 (ASTM A 123). Nuts, washers, threaded couplers, and anchor plates shall be galvanized in accordance with the requirements for Class C of AASHTO M 232M/M 232 (ASTM A 153/A 153M) and/or the requirements for Class 50 of AASHTO M 298 (ASTM B 695).

(C) Deck Unit Erection and Transverse Tensioning:

Nominal Skews: In spans with zero to nominal skew, using only one continuous transverse tensioning rod placed on the skew at each line of internal diaphragms within the deck member, the Contractor shall install and pretighten the transverse tensioning rod(s) after erecting all deck members in the span, prior to grouting the longitudinal shear key joints. The tensioning rod(s) shall be pretightened to 2/3 to 3/4 the required final tension, or as approved by the Engineer, to restrain the members during the grout packing of the shear keys. Upon completion of the pretightening by the Contractor, and the Engineer's approval, the longitudinal shear key joints shall be grouted.

In no case shall the transverse pretightening cause the members to bear non-uniformly on their bearings. The Contractor may have to adjust (temporarily relieve and then progressively increase) the transverse tensioning, and the sequence of grouting joints, to facilitate attaining uniform bearing, as approved by the Engineer. In no case shall the tensioning in each rod exceed the specified final transverse tension, nor shall the rod tensioning be relieved after the grouting of joints commences in the span, except for the Final Tensioning, as specified in this Subsection.

Larger Skews: For spans with larger skews, utilizing short (twice the deck member width), perpendicular tensioning rods installed in pairs at each internal member diaphragm, the member erection and tensioning rod installation shall be done progressively, one member at a time. The installed tension rods shall be tightened to the required final tension; no partial pretightening of the rods will be performed, unless required to eliminate non-uniform member bearing. The Contractor may defer grouting longitudinal shear keys between adjacent members that are fully tensioned transversely (installed without pretightening the tension rods), as approved by the Engineer.

When partial pretightening of the rod(s) is required to attain uniform member bearing, the longitudinal shear key joint shall be grouted immediately after the rod(s) are pretightened. Then, with the acceptance of the grouting by the Engineer, the final transverse tension shall be applied to the rod(s) compressing the joint just grouted, in accordance with the Final tensioning requirements in this Subsection. All partial pretightening requirements for short transverse rods installed in pairs will require those longitudinal joints to be grouted on a 'one joint at a time basis', and the next deck member in the span then erected.

For spans utilizing short perpendicular tensioning rods in pairs, the Contractor shall adjust transverse tightening and shear key grouting procedures as necessary to achieve 1) the required final transverse tensioning with 2) the uniform bearing of all deck members in the span, as approved by the Engineer.

Final Tensioning: The final tensioning in all transverse tie rod systems (full-length single rods and short rods in pairs) shall be accomplished using the Turn-of-the-Nut Method. Before final tensioning of the rod, the nut shall be loose, and then hand-tightened snugly against the seated anchor plate, and then fully tensioned. Pretightened nuts restraining grouted joints shall be backed off until loose, and immediately snugged by hand and fully tensioned.

Transverse tensioning rod systems will be tightened to develop a tensile force of 30,000 lbs (133.45 kN), unless specified otherwise in the Project Plans or Construction Special Provisions. The number of turns of the nut, required for tensioning each specific rod length, will be specified in the Project Plans or Construction Special Provisions.

(D) Grouting: Grout to be used for packing the longitudinal shear key joints shall be a high early strength prepackaged nonshrink grout or a high early strength sand-cement grout with an expansion agent. The high early strength grout materials; packaging and storage; and grout mixing, surface preparation, and placement shall be in full conformance with the current requirements of Section 1017 – NONSHRINK GROUT MATERIALS of the Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction, and shall be a type approved by the Engineer. If the precast deck members were cast with air-entrained concrete, the grout shall use air-entraining Portland cement.

All spaces between deck members at the bottoms of the longitudinal shear keys, where grout could escape, shall be grout-tight before placing the grout. The Contractor shall use backer rod or other similar systems, as required, to ensure that the grout does not escape during placement, as approved by the Engineer.

The grout shall be placed and tightly packed into the longitudinal shear key joints, in accordance with the manufacturer’s recommendations, as approved by the Engineer, completely filling the joints. The exposed surface of the grout shall be struck off even with the tops of the deck members, leaving a uniform surface, which shall be free of holes, pockets, and other surface irregularities.

Immediately after placement is complete, all exposed surfaces of the grout shall be cured by the water method, as specified in Subsection 505.8 of the MCDOT Supplement, or in accordance with the manufacturer’s recommendations, as approved by the Engineer. No loads shall be allowed on tensioned and grouted spans for which the transverse tensioning and grouting has been completed less than 72 hours, unless otherwise permitted by the Engineer.

Section 516, Irrigation and Drainage Grates (Include in projects with a bid item for Irrigation and Drainage Gates of the specified type. Revised April 1, 1999)

SECTION 516 IRRIGATION AND DRAINAGE GATES

The work under this Section consists of furnishing and installing irrigation and drainage gates at the locations shown on Plans and in accordance with the manufacturer's requirements.

Drainage (Flap) gates shall be Waterman Model F-10, Type SF Off Vertical Closure, or approved equal.

Irrigation Slide Gate shall be as indicated on the Plans, or an approved equal.
Payment for all work under this section will be made at the unit bid price for Irrigation and Drainage Gates.

Section 525, Pneumatically Placed Mortar (Include in projects with a bid item for pneumatically placed mortar used for canal lining. Revised April 1, 1999)

SECTION 525 PNEUMATICALLY PLACED MORTAR

Section 525 is supplemented with the following:

The work under this Section consists of placing canal lining in accordance with the Plans and Section 525 of the Uniform Standard Specifications.

Canal lining shall be 80 millimeter (3 inches) thick, hand placed concrete (Class A), or 50 millimeter (2 inches) thick, pneumatically placed mortar, both reinforced with welded wire fabric, 6x6, 1.4/1.4. Lining shall be tied to existing lining.

Section 530, Painting (Include when the project includes a bid item for concrete painting. Revised April 1, 1999)

SECTION 530 PAINTING

Section 530 is supplemented with the following:

The work under this Section consists of painting the concrete surfaces of the bridge as indicated below:

1. Top surface and both faces of concrete bridge railing and railing ending section.
2. Bridge fascia from top of railing base to bottom of deck slab and underside of deck slab for width of bridge.
3. Face of abutments and slope walls to 300 millimeters (300mm) below top of riprap or ground.

4. Pier columns from bottom of deck slab to top of drilled shaft.

Surfaces to be painted do not require a plaster coating as part of the finishing process.

The paint shall be Sher-Clad Exterior Acrylic Latex Flat, B2Y Series Paint as manufactured by the Sherwin-Williams Company of Cleveland, Ohio, or approved equal.

Application of the paint shall be in accordance with the manufacturer's written recommendations.

The color of the paint shall be sand color, subject to approval of the Engineer.

Construction Requirements: The paint shall be applied by an Arizona Licensed Painting Contractor, that is acceptable to the manufacturer and the Engineer.
The Contractor shall prepare a preliminary sample of the bridge and railing paints, each, on concrete slabs at the work site, measuring at least one meter (3 feet) by three meters (10 feet), that shall be left for three weeks for observation.

No paint shall be applied on the project until the samples have been approved by the Engineer.

Payment for all work under this Section will be made at the bid price for Concrete Painting.

Section 610, Waterline Construction (Include in projects when ductile iron pipe is required. Revised April 1, 1999)

SECTION 610 WATERLINE CONSTRUCTION

The work under this section consists of furnishing and installing the water lines and support system as shown on the plans.

All water line construction shall conform to the requirements of Section 610 of the Uniform Standard Specifications and these Construction Specifications. In addition, all components of the water line shall be installed in accordance with the manufacturer’s recommendations.

Pipe shall be ductile iron, thickness Class 53 per Subsection 750.2 of the Uniform Standard Specifications. Pipe shall be cement mortar lined and coal tar coated in accordance with AWWA C-104. Fittings shall be per Subsection 750.4 of the Uniform Standard Specifications. Pipe shall be a restrained push-on rubber gasket joint pipe and joints shall be US Pipe TR Flex Restrained Joint or approved equal.

A combination air release/vacuum relief valve shall be provided at the highest point of the water line. The valve shall be a combination air release/vacuum valve with a minimum orifice size of 6.4 mm (1/4 inch). An expansion joint shall be provided at each side of the relief valve. Air release/vacuum relief valve shall be APCO Series 140 or approved equal. Expansion joints shall be restrained Dresser, Style 63, Type 3 or approved equal.

Drain valves shall be installed at the lowest point of the pipe at each end. After completion of all testing and disinfection procedures in accordance with Section 610 and 611 of the Uniform Standard Specifications, all water shall be drained from the lines and all valves shall be closed. Compressed air shall be used as necessary to insure that all moisture is removed from the lines.

Payment for all work under this section will be made at the bid price per linear meter (linear foot) for Ductile Iron Pipe, and at the unit bid price for Air/Vacuum Relief Valve, Complete In Place.

Section 615, Sewer Line Construction (Include in projects requiring ductile iron pipe for sewer line construction. Revised April 1, 1999)

SECTION 615 SEWER LINE CONSTRUCTION

The work under this section consists of furnishing and installing the sewer lines and support system as shown on the plans.

All sewer line construction shall conform to the requirements of Section 615 of the Uniform Standard Specifications and these Construction Specifications. In addition, all components of the sewer line shall be installed in accordance with the manufacturer's recommendations.

Pipe shall be ductile iron, thickness class 53 per Subsection 750.2. Pipe shall be cement mortar lined and coal tar coated in accordance with AWWA C-104. Fittings shall be per Subsection 750.4. Pipe shall be a restrained push-on rubber gasket joint pipe and joints shall be US Pipe TR Flex Restrained Joint or approved equal.

A combination air release/vacuum relief valve shall be provided at the highest point of the sewer line. The valve shall be a combination air release/vacuum valve with a minimum orifice size of 4.8 mm (3/8 inch). An expansion joint shall be provided at each side of the relief valve.

Air release/vacuum relief valve shall be APCO Series 400 SAVV or approved equal.

Expansion joints shall be restrained Dresser, Style 63, Type 3, 380 mm (15 inches) minimum movement rating, or approved equal.

Pipe installed 30.5 meters (100 feet) minimum on each side of the air/vacuum relief valve shall be polyethylene lined with a nominal thickness of 40 mil conforming to ANSI and ASTM D-1248.

Payment for all work under this section will be made at the price bid per linear meter (linear foot) for Ductile Iron Pipe, Lined Ductile Iron Pipe, unit bid price for Air/Vacuum Relief Valve, Complete In Place.

Section 618, Storm Drain Construction (Include with storm drain construction that only allows reinforced concrete pipe. Revised November 20, 2000)

SECTION 618 STORM DRAIN CONSTRUCTION

The work under this section consists of furnishing and placing concrete pipe as called for on the plans, including connections, in accordance with Section 618 of the Uniform Standard Specifications.

All concrete pipe shall be Class III with rubber gasket joints unless otherwise noted.

Payment for this item will be made at the bid price per linear meter (linear foot) for Reinforced Concrete Pipe of the type and size shown.

Section 622, Pipe Culvert (Include when pipe culvert material is to be determined by the contractor. The Contractor may choose to use reinforced concrete, HDPE pipe, or corrugated metal pipe. Revised April 17, 2001)

SECTION 622 PIPE CULVERT

The work under this section consists of furnishing and installing pipe culvert, including connections.

The Contractor may furnish Reinforced Concrete Pipe, High Density Polyethylene (HDPE) Pipe, or Corrugated Metal Pipe. Reinforced Concrete Pipe shall be Class III, Rubber Gasket, conforming to the requirements of Section 735. HDPE pipe shall conform to the requirements of Section 738. Corrugated metal pipe shall conform to the requirements of AASHTO M-36 and Sections 621 and 760. Corrugated metal pipe shall have a minimum wall thickness of 2.01 mm (14 gauge) and be bituminous coated or bituminous coated and paved.

Installation of reinforced concrete pipe and HDPE pipe shall conform to Section 618. Installation of corrugated metal pipe shall conform to Section 621.

Payment for Pipe Culvert will be made at the unit bid price per meter (linear foot) for each size culvert installed, complete in place.

Section 623 Headwall (Include in projects with a bid item for headwall. Revised June 1, 2000)

SECTION 623 HEADWALL

The work under this section shall consist of constructing headwalls of the types and at the locations shown on the Plans.

Concrete block masonry shall conform to Section 510 and concrete structures shall conform to Section 505.

(Optional Paragraph – delete if not applicable) The work under this Section shall also consist of plaster ditch connections between headwalls and ditches if specified on the Plans. Locations and dimensions shall be as shown on the Plans. Plaster ditch connections are to be included in the bid item for the headwall.

(Pick Measurement & Payment method – delete if not applicable) Measurement for headwalls will be by the square meter (square foot). The surface area measured shall be the product of the wall length times the height of the wall (exposed face) above the footing, excluding the area of the pipe opening.

Payment will be made at the contract unit bid price per square meter (square foot) for Headwall.

(Pick Measurement & Payment method – delete if not applicable) Headwalls will be measured by the number of each type of headwall constructed.

Payment will be made at the contract unit price bid for Headwall of the designated type(s).

Section 626, MISCELLANEOUS STRUCTURES (ROADWAY DRAINAGE AND IRRIGATION) (Include in projects only if directed. This is a draft specification to allow all minor and miscellaneous concrete structures to be precast and the specification will need substantial modification. Revised June 1, 2000)

SECTION 626 MISCELLANEOUS STRUCTURES (ROADWAY DRAINAGE AND IRRIGATION)

626.1 Description: Work under this Section consists of constructing miscellaneous reinforced concrete roadway drainage and irrigation structures, at the locations and in accordance with the details shown on the project plans, and in conformance with these Specifications. Typical Miscellaneous Structures include but are not limited to headwalls, standpipes, junction boxes, catch basins, manhole shafts, delivery structures, headgates, turnouts, etc.

626.2 Materials: Concrete shall be Class AA or Class A, as indicated on the Project Plans, in the project Construction Special Provisions, or in the MAG Standard Details, and shall conform to the requirements of Section 725. Reinforcing steel shall conform to the requirements of Section 727. Masonry materials shall conform to the requirements of Sections 775 and 776. All other materials shall conform to the call-outs on the Project Plans, to the project Construction Special Provisions, to the MAG Standard Details, and/or to appropriate Part 700 materials specifications.

626.3 Construction: Concrete construction shall be in accordance with the requirements of Section 505. Unless specified otherwise in the project Construction Special Provisions, all Miscellaneous Structures defined in Subsection 626.1 are Minor Structures as defined in Subsection 505.1, and may be furnished as precast structures, in accordance with the requirements of that subsection and these Specifications.

Excavation and backfill for Miscellaneous Structures shall be in accordance with the requirements of Section 206.

626.4 Measurement: Measurement for this work will be by specific pay item quantities, or by the unit each, as specified in the contract documents. Measurement by the unit each for Miscellaneous Structures shall include all appurtenant accessories such as but not limited to frames, grates, covers, gates, trash racks, etc.

626.5 Payment: Payment for this work will be made at the contract unit price(s) per specific pay item quantities, or per the unit each. When the measurement is by the unit each, payment will be full compensation for the item, complete in place, including necessary excavation, materials, construction, fabrication and installation, backfilling, and appurtenant accessories, as described on the project plans and in these Specifications.

Section 636, Concrete Canal Lining (Include in projects with concrete lined canals use section 635 for smaller irrigation ditches.)
The specification was developed around SRP requirements, including fiber-reinforced concrete, but based on the MAG Specifications.
(June 1, 2000)

SECTION 636 CONCRETE CANAL LINING

636.1 Description: Work under this Section consists of constructing cast-in-place concrete or pneumatically placed mortar (shotcrete) canal lining in conformance with the details shown on the project plans, the applicable provisions of Sections 505 and 525, the project Construction Special Provisions, and these Specifications.

636.2 Materials: Concrete for cast-in-place concrete canal lining construction shall be air-entrained Class A Portland cement concrete conforming to the requirements of Section 725.

Pneumatically Placed Mortar (shotcrete) for canal lining construction shall conform to the requirements of Subsection 525.3 – Wet Process. Aggregate Gradation No. 2 shall be used for canal linings not thicker than 3 inches (76 millimeters), Aggregate Gradation No. 3 may be used for canal linings thicker than 3 inches (76 millimeters), or the Contractor may use an aggregate gradation as approved by the Engineer.

All concrete for the canal lining, whether cast-in-place or pneumatically placed, shall have fibrous reinforcement incorporated into the concrete mix. The application rate for the fibrous reinforcement shall be 1.5 lbs/cu yd (0.89 kg/cu m). The fibrous reinforcement shall have the following characteristics:

a) Specific Gravity = 0.91
b) Tensile strength = 379 Mpa (55 ksi)
c) Fiber Length Graded = 6 to 15 millimeters (1/4 to 5/8 inches)

The fibrous reinforcement shall produce fiber-reinforced concrete and fiber-reinforced shotcrete that complies with the current version of ASTM C 1116, Section 4 – Classification, 4.1.3 – Type III Synthetic Fiber-Reinforced Concrete or Shotcrete. Documented performance of the fiber-reinforced concrete and fiber-reinforced shotcrete shall comply with Performance Level I, as specified in Section 21 – Performance Requirements, of the current version of ASTM C 1116.

Reinforcement for Concrete Canal Lining shall be 4 x 4 – W1.4 x W1.4 (102 x 102 – MW9.1 x MW9.1) welded wire fabric conforming to the material requirements of AASHTO M 55M/M 55 (ASTM A 185), unless specified otherwise in the contract documents. All welded wire fabric shall be galvanized in accordance with ASTM A 641/A 641M, “regular coating”.

All appurtenant accessories for Concrete Canal Lining shall meet the specification requirements of the contract documents.

636.3 Construction:

636.3.1 Subgrade: Subgrade for the Concrete Canal Lining shall be shaped and compacted in accordance with the requirements of Section 215, except that all shaped subgrade surfaces shall be compacted to 85 percent uniform density. Finished surfaces shall be uniform planes and/or uniformly varying transitions as required by the project plans, and shall be free of large rocks, voids, and loose material. Subgrade tolerances shall be in conformance with Subsection 505.10.1(F) of the MCDOT Supplement, or as approved by the Engineer.

The canal bank and bottom lining subgrade surfaces shall be maintained in a moist condition, within 2 percent of the optimum moisture content, at all times prior to the installation of the concrete canal lining, to provide dust abatement and prevent premature drying and cracking of the concrete canal lining upon installation.

636.3.2 Reinforcing Steel: The width of fabric rolls shall be not less than 5 feet (1.5 meters). J-hook fabric pins shall be fabricated from 9-gage (3.76 millimeters diameter) or larger wire and provide adequate strength and anchorage to secure the wire mesh fabric, as approved by the Engineer.

The welded wire fabric shall be clean prior to placement, and shall be maintained in a clean condition until completely embedded in the lining concrete. Welded wire fabric shall not be installed until the Engineer has approved the area of canal subgrade over which the fabric is to

be placed. The welded wire fabric shall be installed longitudinally to the canal; all fabric shall be cut and fit as required for the fabric to be placed flat, without bulging. All laps/joints shall be lapped not less than one mesh width, and laps at the roll ends shall be staggered. J-hook pins shall be spaced to anchor the welded wire fabric, and to prevent displacement of the installed fabric during concrete placement, as approved by the Engineer. Climbing on the canal bank subgrade and the welded wire fabric placed on the canal bank will not be permitted.

636.3.3 Concrete Canal Lining: The Contractor shall use concrete conforming to the requirements of Subsection 636.2 of this Section for the canal lining. Either cast-in-place concrete or pneumatically placed mortar (shotcrete) shall be used for the canal bottom lining; pneumatically placed mortar (shotcrete) shall be used for the canal bank lining.

The Contractor shall not place canal lining concrete for the canal bottom and the canal bank, respectively, until the Engineer has approved the respective canal subgrade preparations and reinforcement installations. All absorptive surfaces against which concrete will be placed shall be pre-moistened in conformance with the requirements of Subsection 636.3.1 of this Section, but no concrete shall be placed on subgrade having free water on the surface.

The thickness of the concrete canal lining shall be as detailed on the plans; the minus thickness tolerance shall be zero. The positive thickness tolerance for the canal bottom lining shall be that required to meet canal profile grade; the finished grade of the concrete bottom lining shall be within 0.1 foot (30 millimeters) of the plan elevations, or as approved by the Engineer. The positive thickness tolerance for the canal bank lining is nominal. Overall dimensional tolerances for the completed canal complex, encompassing lining and appurtenant features, shall be consistent with the project contract documents.

Placed concrete shall be compacted/vibrated by suitable means, as approved by the Engineer. All construction joints between the new canal lining and the existing canal lining and/or new and existing appurtenant features shall conform to the details on the project plans. The finished surface of the concrete canal lining shall be even and uniform, without rock pockets and surface voids, and free from ridges and other projections. The finish of the concrete canal bottom shall be skid resistant; the concrete canal bank lining shall have a uniform broom finish.

The finished concrete shall be cured by the use of a white pigmented membrane-forming compound conforming to the requirements of Section 726.

636.4 Measurement: Measurement for this work will be by the square yard (meter) of Concrete Canal Lining, as detailed on the project plans.

636.5 Payment: Payment for this work will be made at the contract unit price per square yard (meter) for Concrete Canal Lining. Payment shall be full compensation for Concrete Canal Lining, complete in place, including all labor, materials, and equipment.